

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
13 June 2002 (13.06.2002)

PCT

(10) International Publication Number
WO 02/047365 A1

(51) International Patent Classification⁷: **H04M 1/02**

(21) International Application Number: **PCT/EP01/14110**

(22) International Filing Date: 3 December 2001 (03.12.2001)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
200 20 407.6 4 December 2000 (04.12.2000) DE

(71) Applicant and

(72) Inventor: **LARSON, Philip, Paul** [US/DE]; Schleis-
sheimerstr. 426, Geb. 31, 80935 Munchen (DE).

(81) Designated States (*national*): AE, AG, AL, AM, AT (uti-
lity model), AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA,
CH, CN, CO, CR, CU, CZ (utility model), CZ, DE (uti-
lity model), DE, DK (utility model), DK, DM, DZ, EC, EE

(utility model), EE, ES, FI (utility model), FI, GB, GD, GE,
GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ,
LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN,
MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI,
SK (utility model), SK, SL, TJ, TM, TR, TT, TZ, UA, UG,
US, UZ, VN, YU, ZA, ZW.

(84) Designated States (*regional*): ARIPO patent (GH, GM,
KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW),
Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM),
European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR,
GB, GR, IE, IT, LU, MC, NL, PT, SE, TR), OAPI patent
(BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR,
NE, SN, TD, TG).

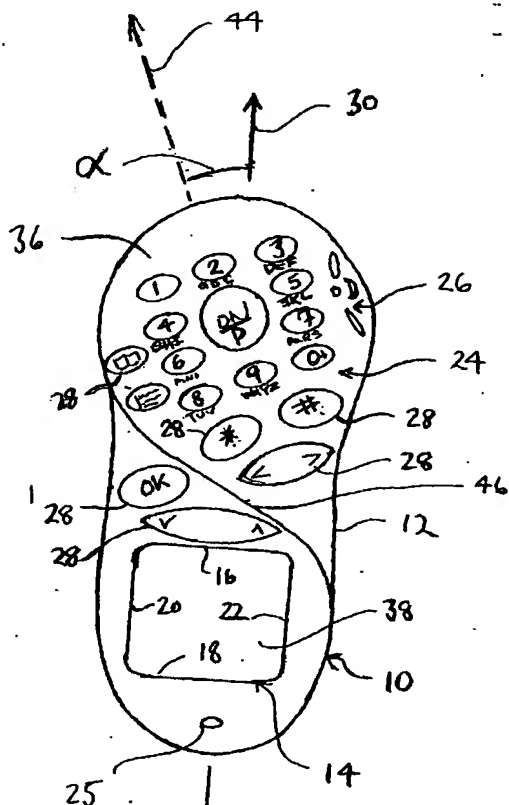
Published:

- with international search report
- with amended claims

Date of publication of the amended claims: 10 April 2003

[Continued on next page]

(54) Title: **ERGONOMIC MOBILE HAND-HELD COMMUNICATION/COMPUTER DEVICE**



(57) Abstract: An electronic hand-holdable device, such as a mobile phone or Pocket PC, comprises a body, a screen for displaying information in an orientation defining a top and left and right sides of the screen, and a field of keys defining the numbers one to nine and zero and letters of the alphabet, and is characterised in that the field of keys is disposed above the top of the screen or to the side of the screen (Fig. 1). The field of keys can lie in a plane rotated through an angle θ relative to the plane of the screen about the longitudinal axis of the device (Fig. 3) and the field of keys can have an inscription defining an orientation which subtends an angle α relative to the longitudinal direction (Fig. 1). In a preferred embodiment of a Pocket PC, the direction of writing on the screen can be changed depending on the orientation of the field of keys (Fig. 8, Fig. 10).

WO 02/047365 A1



For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

Ergonomic mobile hand-held communication / computer ⁽¹⁾ device

Technical Field

The present invention relates to an electronic hand-holdable device comprising a body, a screen for displaying information in an orientation defining a top and left and right sides of the screen, and a field of keys defining the numbers
5 one to nine and zero and letters of the alphabet and various function keys.

Background Art

Electronic hand-holdable devices of this kind are well known in various forms, such as mobile telephones, wireless home phones and pocket personal computers.

10 Conventional mobile telephones are arranged such that the field of keys is disposed beneath the screen with the rows of keys generally aligned with the bottom side of the screen. Although this design is extremely wide-spread in practice, it is not considered ideal because it makes the mobile telephone
15 awkward to use, particularly in small phones, if single-handed operation is desired.

Pocket Personal Computers, hereinafter referred to as PPC(s) which have a field of keys placed at the bottom of the screen which are used in conjunction with a pen adapted to write
20 on the screen. The trend has been more to devices in which the user writes on the screen, because this enables the PPC to be used as a digital notepad. However, if one observes users of PPCs

they invariably need both hands to use the device, in order to hold it and to enter information on it and they are frequently forced by the current designs of devices to use both hands to be able to access or input information. This makes their operation
5 difficult if not impossible while performing any other task.

Disclosure of Invention

The object of the present invention is to improve the ergonomic design of hand-holdable devices of the initially named kind, so as to operate them with one hand and to make them easier to use in practice and preferably also to facilitate their use
10 by left or right-handed persons.

In order to satisfy these objectives, there is provided an electronic hand-holdable device of the initially named kind, which is characterised in that the field of keys is disposed above the top of the screen or to the side of the screen, depending
15 upon screen display orientation.

Through this step of reorganising the layout of electronic hand-holdable devices it becomes possible to realise a mobile telephone which is much more simply used in one-handed operation, and indeed by left or right-handed persons. In a conventional
20 mobile phone, the phone is frequently supported at the bottom of the phone by the user's little finger, and the thumb is positioned at the level of the screen and has to move downward to the extreme limit of its range of movement to press keys at the bottom of the field of keys. This is uncomfortable, often
25 inaccurate and can lead to repetitive stress syndrome.

For a PPC, the field of keys is more conveniently disposed at the top of the screen for single-handed operation, or at one side of the screen when changing orientation of the screen to display information in landscape mode, which enables a user to
5 hold the device in one hand and to operate the keys using the other hand in a convenient manner.

In a particularly preferred embodiment the field of keys is disposed generally in a plane, with the plane being rotated or rotatable relative to the plane of the screen about a
10 longitudinal axis of the body. The concept of the field of keys being disposed generally in a plane gives expression to the fact that the plane need not necessarily be flat, but can be a slightly curved plane. Irrespective of whether this plane is flat or slightly curved, the fact that it is rotated (or rotatable)
15 relative to the plane of the screen with respect to a longitudinal axis of the body improves the ergonomic design of the device making it easier for the user to operate the keys while viewing the screen.

If the device is designed such that the plane of the keys
20 is rotated relative to the plane of the screen about a longitudinal axis of the body but in a fixed position, then this makes the device, for example a mobile telephone, a handed device, so that different models are required for left and right-handed users.

25 If, however, the plane of the keys can be variably rotated relative to the plane of the screen with respect to a longitudinal axis of the body, then the mobile telephone can be used by anybody, irrespective of whether they are left or right-handed, since

the respectively desired plane of the keys with respect to the screen can be set simply by rotating the field of keys about the longitudinal axis of the body to the left or right.

In a device of the initially named kind the keys of the field
5 of keys will generally have an orientation defined by the inscription on the keys and this orientation should, in accordance with the invention, define an angle with the longitudinal direction of the device, said angle being from 0° to 90° , preferably 30° to 60° , and especially approximately
10 45° to either side of said longitudinal direction. The angle referred to here is thus a different angle from the angle of rotation of the plane of keys relative to the plane of the screen about a longitudinal axis of the body, the latter rotation being a rotation about the longitudinal axis, whereas the angle
15 referred to with respect to the inscription on the keys is an angle of rotation achieved by rotating the field of keys in the plane in which they are orientated.

This concept of varying the angle of rotation of the plane of the field of keys relative to the plane of the screen allows
20 a further improvement in the ergonomic design of a hand-holdable device, in particular of a mobile telephone or PPC.

To facilitate utilisation of the hand-holdable device by left and right-handed users, the angle of rotation of the plane of the field of keys relative to the plane of the screen is
25 preferably variable. To facilitate this rotation, the field of keys is conveniently provided on a support rotatable relative to the body and the support is preferably made rotatable relative to the body through an angle of 360° .

Another embodiment is a variable field of keys support which pivots on the upper half of said support. This allows both for adjustment of the angle and for ease of use in right or left hand.

- 5 An arrangement of this kind is particularly advantageous in a PPC since it provides the user with a substantial degree of freedom, with respect to the orientation of the field of keys relative to the screen.

10 In a particularly preferred embodiment of this kind, an electronic link is present between said support and a controller for said screen to select the orientation of information displayed on the screen in dependence on the rotational position of the support relative to said body. For example, if the user chooses to use his PPC with the screen to the left of the field
15 of keys, then the electronic link will enable the device to present the information displayed running across the screen in a landscape mode. If, on the other hand, the user chooses to have the screen below the field of keys, achieved by physically rotating the device through 90° so that it now reads in portrait
20 mode related to the new orientation of the device and of the screen.

Further preferred embodiments of the present invention can be seen from the claims and from the accompanying description of preferred embodiments.

Description of Drawings

The invention will now be described in more detail with reference to specific embodiments having regard to the accompanying drawings in which are shown:

- 5 Fig.1 a plan view of the front face of a first embodiment of an electronic hand-holdable device in the form of a mobile telephone in accordance with the present invention,
- 10 Fig.2 a view of the device of Fig. 1 as seen from the right side, with Figs. 2A and 2B serving to clarify the angle of twist of the field of keys relative to the plane of the screen about the longitudinal axis of the device, Figs.
- 3 and 4 views of a further embodiment of a mobile telephone in accordance with the present invention corresponding to the views of Figs. 1 and 2 of the first embodiment,
- 15 Fig.5 a view similar to that of Fig. 4 but showing the phone with a different twist of the field of keys relative to the screen suitable for use via a left-handed person,
- 20 Fig.6 a view from the front of an electronic hand-holdable device in the form of a mobile phone/PPC in accordance with the present invention,
- Fig.7 a view of the device of Fig. 6 after a physical rotation of the body of the device through 180° in the plane of the drawing,

- Fig.8 a view of the device of Fig. 6 after rotation of the body through 90° in a clockwise direction in the plane of the drawing of Fig. 7, for right-hand operation,
- 5 Fig.9 a view of the same device of Fig. 6 after rotation through an angle of 90° in the counter clockwise direction in the plane of the drawing of Fig. 6 for left-hand operation.
- 10 Fig.10 a further embodiment of a mobile phone/PPC in accordance with the invention in a representation similar to that of Fig. 6, but with the field of keys on a pivoting platform set at a particular 45° angle relative to the longitudinal direction of the device, for right-hand use.
- 15 Fig.11 a view of the same device as Fig. 10 with key pad moved on pivot for left-hand use.
- Fig.12 the device of Fig. 10 after rotation in the plane of the drawing of Fig. 10 through 90° in the clockwise direction, for right-hand use.
- 20 Fig.13 the device of Fig. 10 after rotation in the plane of the drawing of Fig. 10 through 90° in the counter clockwise direction, for left-hand use.

Turning now to Fig. 1 there can be seen a view of the front side of an electronic hand-holdable device 10 in the form of a mobile telephone comprising a body 12, a screen 14 for displaying information in an orientation defining top and bottom sides 16 and 18 of the screen and left and right sides 20 and 22 of the screen. In addition there is a field of keys 24 defining the numbers 1 to 9 and 0 as well as letters of the alphabet. In addition, the mobile telephone includes a microphone 25 and a speaker arrangement shown generally at 26 as well as various further keys, all indicated by the reference numeral 28 and all carrying symbols conventional in the field of mobile phones. The keys 28 can be used for further functions typically associated with a mobile telephone and well understood in the art. The body 12 of the mobile telephone, which encloses the usual electronic system of a mobile telephone, can be thought of as defining a central longitudinal direction or axis of the phone 30 which extends in the same general direction as the left and right sides 20 and 22 of the screen, but is centrally disposed through the body 12.

As can be seen from the side view of Fig. 2, the body 12 has a set of three individual concavely curved finger-receiving depressions 32 provided in the middle of the back of the body with the depressions being sized to accommodate at least three fingers of an average sized human hand and being positioned in the longitudinal direction of the body at the level of the screen.

In accordance with the invention the screen is thus provided in this embodiment beneath the field of keys, i. e. the field of keys is disposed above the top 16 of the screen. Moreover, the field of keys is disposed generally in a fixed plane identified in Fig. 1 by the reference numeral 36, with this fixed plane being rotated relative to the plane of the screen identified in Fig. 1 by the reference numeral 38 about a longitudinal axis of the body as can be seen from the representation of Fig. 2 and appreciated more readily from the sketches of Figs. 2A and 2B.

10 In Fig. 2A the screen 38 is seen from the right side and therefore appears schematically as a straight line. The plane of the field of keys 36 is seen in an oblique view as schematically illustrated in Fig. 2A. Using the convention adopted to define planes in mathematics, the plane of the screen 38 is represented by a first

15 vector 40 standing perpendicular to its plane and the plane 36 is represented by a second vector 42 again standing perpendicular to its plane. Referred to the longitudinal direction 30 these two vectors 40 and 42 subtend an angle θ to one another as shown in Fig. 2B. The angle of rotation θ of the plane of the field

20 of keys relative to the plane of the screen about the longitudinal axis 30 amounts in this embodiment to about 15° . However, the angle can be selected to have any desired value up to about 45° . Beyond this angle it is different to see the keys when observing the screen and thus difficult for a user to find the right keys.

25 In addition, an angle above 45° is considered ergonomically disadvantageous.

In addition, as can be seen from Fig. 1, the keys of the field of keys have an orientation defined by the inscription on the keys and this orientation is schematically represented by the

30 arrow 44 which has been drawn into Fig. 1 in broken lines. It

can be seen that this orientation defines an angle α relative to the longitudinal direction of the phone (when both direction are projected into the plane of the drawing of Fig. 1) of, in this example, 30. Again, this angle could be different. It could
5 for example, without restriction, lie in the range from 5° to 45° for right-hand use, and -5° to -45° for left-hand use.

The design of the telephone shown in Figs. 1 to 3 is considered ergonomically much more satisfactorily than the current designs of conventional mobile telephones in which the screen is arranged
10 above the field of keys within the same plane for the following reasons:

- a) when the phone is held in one hand, the keys above the screen can be reached much more comfortably with the thumb of the user, which is typically used to press the keys, without the
15 thumb (which is located at the top of the hand) having to be moved to the extreme limits of its range of movement. This helps avoid repetitive stress syndrome, by maintaining a more natural range of motion by the thumb,
- b) movement of the thumb does not obscure the screen,
- 20 c) the rotation about the longitudinal axis and the rotation in the plane of the keys makes it easier to reach the keys with the thumb, as the plane of keys are now more in line with the plane of the thumb as defined by the plane of the thumbnail,
- 25 d) the phone is more stable to hold and there is less danger of dropping it,

- e) it makes it possible to shade the screen with the palm of the user's hand, which makes it easier to view the screen in bright conditions,
- f) it allows for faster use of the phone, quicker retrieval of
5 information and more rapid dialling of numbers,
- g) because the keys are more easily reached by the thumb dialling is more accurate as is the selection of desired functions.

The mobile phone of Fig. 1 and 2 is a handed phone in the sense that it is adapted for use by a right-handed person, but
10 is not well suited to a left-handed person. This problem can be overcome by modifying the design so that it is suited for a left-handed person. In such a design, the angle \hat{a} would be defined clockwise with respect to the longitudinal direction 30, rather than counter clockwise as in Fig. 1 and the angle θ would be
15 defined in a clockwise sense relative to the vector 42 rather than in a counter clockwise sense as shown in Fig. 2B. In addition, the line of the moulding 46 of the body 12 of the mobile telephone which extends diagonally in Fig. 1 from bottom right to top left would extend in a left-handed phone from the bottom left to the
20 top right and the keys 28 shown to the left of the moulding line 46 in Fig. 1 would appear to the right of the corresponding moulding line in a left-handed version of the phone. The phone just described can be referred to as an ergo fixed twist phone.

Turning now to the embodiment of Figs. 3 to 5, there is shown
25 a second version of a mobile telephone, which is essentially similar to that of Figs. 1 and 2, but with certain additional features.

In the description of the mobile telephone of Figs. 3 to 5, the same basic reference numerals will be used as were used in the description of the mobile telephone of Figs. 1 and 2, but increased by the number 100 to enable easy differentiation
5 between the embodiments. The description previously given with respect to the reference numerals used in Figs. 1 and 2 will be understood to apply to the embodiment of Figs. 3 to 5 unless something to the contrary is stated.

New reference numerals will be used to identify features of
10 the design of Figs. 3 to 5, which are not present in the embodiment of Figs. 1 and 2.

The first important difference between the embodiment of Figs. 3 to 5 and the embodiment of Figs. 1 and 2 is that the "head" portion 150 of the body 112 of the mobile telephone 110
15 can be rotated relative to the tail portion 152 about the longitudinal axis 130 of the phone. For this purpose a rotatable articulated joint is provided between the body portion 150 and the tail portion 152 as schematically illustrated at 154. This feature means that the head portion 150 of the phone can be rotated
20 relative to the tail portion 152 through a variable angle θ (using the description of the relevant angle given in connection with Figs. 2A and 2B). This has the important benefit, that the head portion 150 can be twisted either counter clockwise about the longitudinal direction 130 as shown in Fig. 4 to suit a
25 right-handed user or clockwise as shown in Fig. 5 to suit a left-handed user.

In addition, the field of keys 124 is provided here on a rotatable support 156 and can be rotated about an axis 158 in

either direction as shown by the double arrows 160 in Fig. 3 in order to select the precise angle α shown in Fig. 1. Thus, as shown in Fig. 4, the angle α can be selected as in the embodiment of Fig. 1 to suit a right-handed user and the field of keys can
5 be rotated about the longitudinal axis 130 through the angle θ to the orientation shown in Fig. 5 to suit a left-handed user. For the left-handed user, the field of keys is also rotated so that the angle α suits the left-handed user.

In this embodiment the back tail section 152 is designed with
10 three concave depressions 162 designed to receive three fingers of a user. The tail portion 152 of the body of the phone is scalloped at the side as indicated by 164 to facilitate holding of the phone by either a left or right-handed user. The scalloped side regions 164 can be formed as rubberised side grips and the
15 concave recess 132 with the concave finger depressions 162 can also be formed as a rubberised finger mould in an ergonomic design. The Figs. 3 to 5 also show how an antenna 166 and dual microphones 125 can be integrated into the hand-held phone in addition to the speaker 26.

20 Turning now to Figs. 6 to 9, there is shown a first embodiment of a PPC in accordance with the invention.

This PPC includes, in similar manner to the mobile telephone of the previous Figures, a body, a screen and a field of keys.

Because the PPC of the embodiment of Figs. 6 to 9 (as also
25 the PPC of the further embodiment of Figs. 10 to 13) has the same basic components as the mobile telephone of the previous embodiments, these components will be described using the same

basic reference numerals for common components, but increased by the basic number 200 (for the embodiment of Figs. 6 to 9) and 300 (for the embodiment of Figs. 10 to 13) respectively, in order to achieve a clear differentiation between the
5 embodiments. It will be understood that the description given to parts having the same basic reference numerals in connection with previous embodiments also applies to other embodiments having the same basic reference numerals so that the description of these features and components need not be repeated. However,
10 where different features or components are present a description will be given using new reference numerals.

The PPC of Figs. 6 to 9 can be used with any orientation of the body 212 selected by the user, in particular in any one of the four orientations shown in Figs. 6 to 9. In the embodiment
15 of Fig. 6 the screen 214 is arranged, as in the mobile telephone of the previous embodiments, beneath the field of keys 224 and the field of keys 224 is arranged on a support 256 similar to the design of the embodiment of Fig. 3 and is rotatable in the direction of the double arrow 260. In this embodiment, the support
20 256 is permitted to rotate through any angle up to 360°, with wire leads running through the central pivot point 258 connecting the pad to the internal electronics. In another embodiment rotation through an angle of more than 360° could be permitted, but this is not preferred because it can lead to twisting of the
25 leads connecting the keys to the electronic components housed within the body 212. If leads are not used then such a design will normally necessitate the use of slip rings and brushes, allowing for a continuous rotation in either direction.

In this design four sensor strips 219 are arranged around the rotatable support 256 for the field of keys and a signalling device 221 is provided on the rotatable support 256 which results in an output signal from the particular sensor strip 219 disposed
5 opposite to the signalling device, i. e. sensor 221 in Fig. 6. Each sensor is associated with one quadrant of the range of rotation of the support pad 256 and produces a signal showing that the signalling device is located within that quadrant, as indicated by the short arcuate lines to either side of each
10 schematically indicated sensor. One possibility for realising this arrangement could be to provide a permanent magnet as the signalling device and an electronic detector for the magnetic field as the sensor. Alternatively the signalling device could be an LED and the sensor could be semiconductor light detector,
15 or a plurality of adjacent detectors arranged along an arc of each quadrant, as symbolised by the short arcuate lines in Fig. 6. An electronic link is provided between the sensors and the screen to control the orientation of the information on the screen as schematically shown in the drawings. Thus, in the embodiment
20 of Fig. 6 with the screen disposed beneath the field of keys 224, i. e. with the field of keys disposed at the top of the screen, the controller senses a signal from the sensor 219 via the electronic link (not shown) and controls the screen to present the information in a normal orientation which can be read from
25 the left to right, i. e. rows of information extending generally perpendicular to the longitudinal direction 230 of the PPC from the left side 220 of the screen to the right side 222. Because the user may prefer to rotate the field of keys 224 on the support 256 through an angle such as θ in Fig. 1, the electronic link
30 between the field of keys and the controller for the screen is designed to allow a certain rotation of the field of keys to

maintain the orientation of the presentation of information of the screen.

If now the user of the PPC prefers to have the screen at the top of the device, then, as shown in Fig. 7, he will rotate the body 212 of the PPC through 180° in the plane of the drawing and this would mean, without the electronic link of the present invention, that the information presented on the screen would be upside down. However, due to the electronic link provided by the invention, the controller for the screen now changes the orientation of the information so that it again reads in rows from the left to the right in a normal manner despite the inverted orientation of the PPC. That is to say the information now reads from the side 222 of the screen to the side 220 of the screen having regard to the definition of these sides in Fig. 6. It will be noted that in the orientation of Fig. 7 the field of keys has been rotated on the support relative to the body of the phone through 180° relative to the position shown in Fig. 6. If this were not done, then the inscription of the keys would read upside down. The rotation of the key pad or support 256 through 180° can be sensed via the sensors 219 in order to provide an input to the electronic link telling it that the information on the screen needs to be inverted relative to the direction of presentation in Fig. 6.

Again, the user may prefer to have the field of keys 224 set at an angle α relative to the longitudinal direction 230 and the sensor, which provides the information for the electronic link to invert the reading on the screen, can be designed to permit a certain degree of rotation of the key pad, for example $\pm 45^\circ$, relative to the position shown in Fig. 7 without affecting

the orientation of the information provided on the screen. This facility again helps ergonomic adaptation to left and right-handed users.

As shown in Fig. 8 the hand-holdable device of Fig. 6, i.e. the PPC, can also be rotated simply through 90° clockwise in the plane of the drawing relative to the representation of Fig. 6. The field of keys 224 is now located to the right of the screen and the field of keys itself has been rotated in the direction of the arrow 260 counter clockwise through 90° relative to the position in Fig. 6. This rotation is sensed via the sensors 219 and communicated via the electronic link to the controller for the screen causing the controller to change the orientation of the information presented on the screen so that it now reads from the left to the right as shown in Fig. 8. I. e. the information now reads from bottom side 218 to top side 216 having regard in Fig. 6.

Again, the angle of rotation of the key pad need not necessarily be through 90° but can be through slightly more or slightly less depending on the preference of the particular user, without this affecting the way the information is presented on the screen.

The embodiment of Fig. 10 may be, for example, appropriate for a right-handed user.

The same PPC can however also be used by a left-handed user for which the orientation shown in Fig. 9 is preferred. It can be seen that the field of keys 224 is now to the left of the screen and that the orientation of the field of keys has been rotated

through 90° clockwise relative to the representation in Fig. 6 (equivalent to 270° anticlockwise). Again, the sensor 219 which detects the orientation of the field of keys sends a signal via the link to the controller for the screen to change the direction of presentation of information on the screen, so that it again reads from left to right, i. e. from the top side 216 to the bottom side 218 with respect to the representation of Fig. 6. Again, the field of keys can be rotated on its support through a slight angle relative to the representation shown in Fig. 11 if the user so prefers without changing the direction of orientation of the information on the screen.

Turning now to the embodiment of Figs. 10 to 13 there is shown an alternative embodiment of a PPC in which the field of keys 324 is affixed relative to the body 312 of the PPC, on a support which pivots 358 to point to the left or right side of the body, so that an angle α shown in Fig. 1 can be created preferably from -45° to +45°. The PPC of Figs. 10 to 13 can be used either in a vertical orientation as shown in Figs. 10 and 11 or in the orientation of Figs. 12 and 13, i. e. rotated through 90° clockwise or counter clockwise in the plane of the drawing relative to the representations of Figs. 10 and 11 for right-hand or left-hand use. Again, a means of signalling the changed orientation of the device to the controller for the screen is provided in a sensor that signals the screen at the end of its pivot range, whereby the controller for the screen can now present the information so that it reads from the left to the right in the horizontal orientation of Figs. 12 and 13, i. e. effectively from the bottom side 318 to the top side 316 of the screen in Fig. 12 relative to the orientation of Fig. 10 and from 316 to 318 in Fig. 13. It is possible as well to provide either a separate

key which the operator can actuate to advise the controller for the screen of the orientation of presentation of information that is desired or, alternatively, a combination of two or more existing keys can be used for this purpose, such that the
5 orientation in which information is presented on the screen only changes when the precise combination of keys is simultaneously selected.

These possibilities, i. e. a separate key for advising the controller for the screen of the preferred direction of
10 presentation of information on the screen, or use of a combination of keys for the same purpose, can also be applied to the embodiment of Figs. 6 to 9.

It can be seen from the foregoing that there is a great deal of commonality between the PPC(s) of the embodiments of Figs. 6
15 to 13 and the mobile telephone of the embodiments of Figs. 1 to 5 and this reflects the concept that as mobile telephones become capable of further functions, such as Internet access, SMS, video, etc., the two classes of devices may in fact merge, so that one device can be used for both purposes and, for example, access
20 the same data bases, such as address lists, lists of telephone numbers, scheduling, e-mail, etc.. That is to say the differences between the two classes of device will be more in the software embodied in them than in their actual physical appearance and layout. The embodiments exhibited here, provide for new, more
25 ergonomic and user-friendly devices to meet this current and future need. This natural and straightforward means of use can be applied to the most basic mobile phone, home wireless phone, or to the most complex combination of mobile phone/MP3/Pocket PC/video conferencing device.

Claims

1. An electronic mobile hand-held device comprising a body, a screen for displaying information in an orientation defining a top and left and right sides of the screen, and a field of keys defining the numbers one to nine and zero and letters of the alphabet, characterised in that, the field of keys is disposed above the top of the screen or to the side of the screen.
2. A device in accordance with claim 1, wherein the field of keys is disposed generally in a plane, said plane being rotated or rotatable relative to the plane of the screen about a longitudinal axis of the body.
3. A device in accordance with claim 2, in which the angle of rotation θ of the plane of the field of keys relative to the plane of the screen is fixed.
4. A device in accordance with claim 3, wherein said angle of rotation θ is between 0° and 45° .
5. A device in accordance with any one of the claims 1 to 3, in which the keys of the field have an orientation defined by the inscription on the keys and this orientation defines an angle α with the longitudinal direction of the device, said angle being in the range from 0° to 90° , preferably 30° to 60° , and especially approximately 45° , to either side of said longitudinal direction.

6. A device in accordance with claim 2, in which the angle of rotation α of the plane of the field of keys relative to the plane of the screen is variable.
7. A device in accordance with claim 6, and adapted to permit selection of said angle of rotation α in the range from -45° to $+45^\circ$.
8. A device in accordance with any one of the preceding claims, in which the field of keys is provided on a support rotatable relative to the body.
9. A device in accordance with claim 8, wherein said support is rotatable relative to said body through an angle of less than 360° .
10. A device in accordance with claim 8 or claim 9, wherein an electronic link is present between said support and a controller for said screen to select the orientation of information displayed on the screen in dependence on the rotational position of the key support relative to said body.
11. A device in accordance with any one of the preceding claims, in the form of a mobile phone.
12. A device in accordance with any one of the preceding claims, in the form of a Pocket Personal Computer.
13. A device in accordance with any one of the preceding claims, in the form of a combination of mobile phone and Pocket Personal Computer.

AMENDED CLAIMS

[received by the International Bureau on 16 July 2002 (16.07.02);
original claims 1-13 amended (3 pages)]

1. An electronic mobile hand-held device comprising a body, a screen for displaying information in an orientation defining a top and left and right sides of the screen, and a field of keys defining the numbers one to nine and zero and letters of the alphabet, characterised in that, the field of keys is disposed generally in a plane, said plane being rotated or rotatable relative to the plane of the screen about a longitudinal axis of the body.
2. A device in accordance with claim 1, in which the angle of rotation θ of the plane of the field of keys relative to the plane of the screen is fixed.
3. A device in accordance with claim 2, wherein said angle of rotation θ is between 0° and 45° .
4. A device in accordance with claim 1, in which the angle of rotation α of the plane of the field of keys relative to the plane of the screen is variable.
5. A device in accordance with claim 4, and adapted to permit selection of said angle of rotation α in the range from -45° to $+45^\circ$.
6. A device in accordance with claim 1, wherein the field of keys is provided on a support rotatable relative to the body.

7. An electronic mobile hand-held device comprising a body, a screen for displaying information in an orientation defining a top and left and right sides of the screen, and a field of keys defining the numbers one to nine and zero and letters of the alphabet, characterised in that, the field of keys is provided on a support rotatable relative to the body.
8. A device in accordance with claim 6 or claim 7, wherein an electronic link is present between said support and a controller for said screen to select the orientation of information displayed on the screen in dependence on the rotational position of the key support relative to said body.
9. An electronic mobile hand-held device comprising a body, a screen for displaying information in an orientation defining a top and left and right sides of the screen, and a field of keys defining the numbers one to nine and zero and letters of the alphabet, characterised in that, the field of keys is provided on a support which pivots relative to the body.
10. A device in accordance with claim 9, wherein an electronic link is present between said support and a controller for said screen to select the orientation of information displayed on the screen in dependence on the pivotal position of the key support relative to said body.
11. A device in accordance with any one of the preceding claims, in the form of a mobile phone.
12. A device in accordance with any one of the preceding claims, in the form of a Pocket Personal Computer.

13. A device in accordance with any one of the preceding claims,
in the form of a combination of mobile phone and Pocket Personal
Computer.

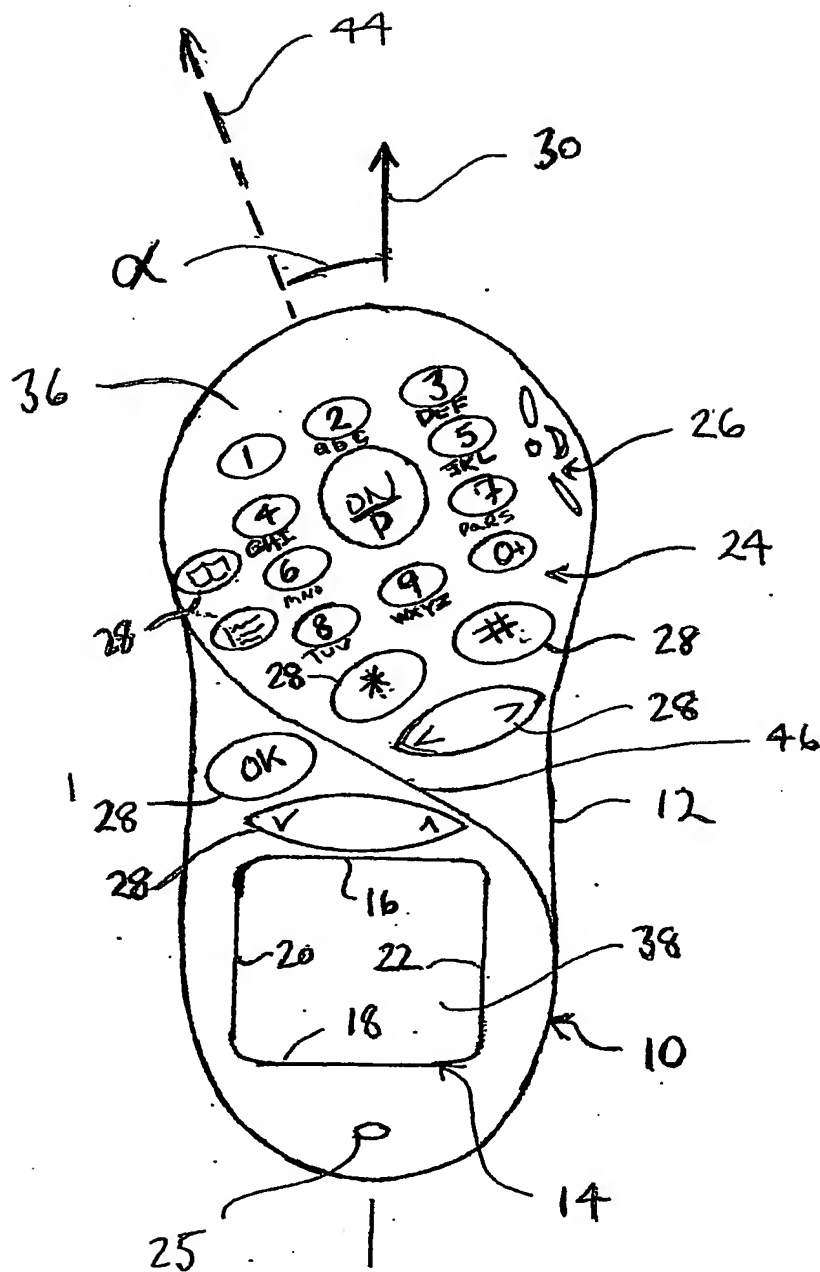
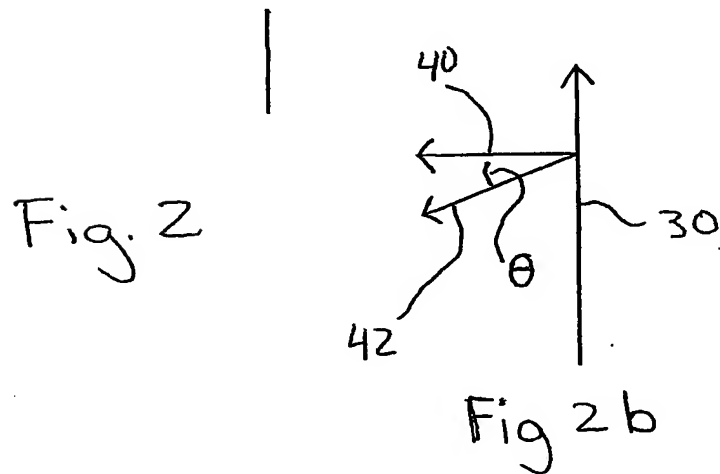
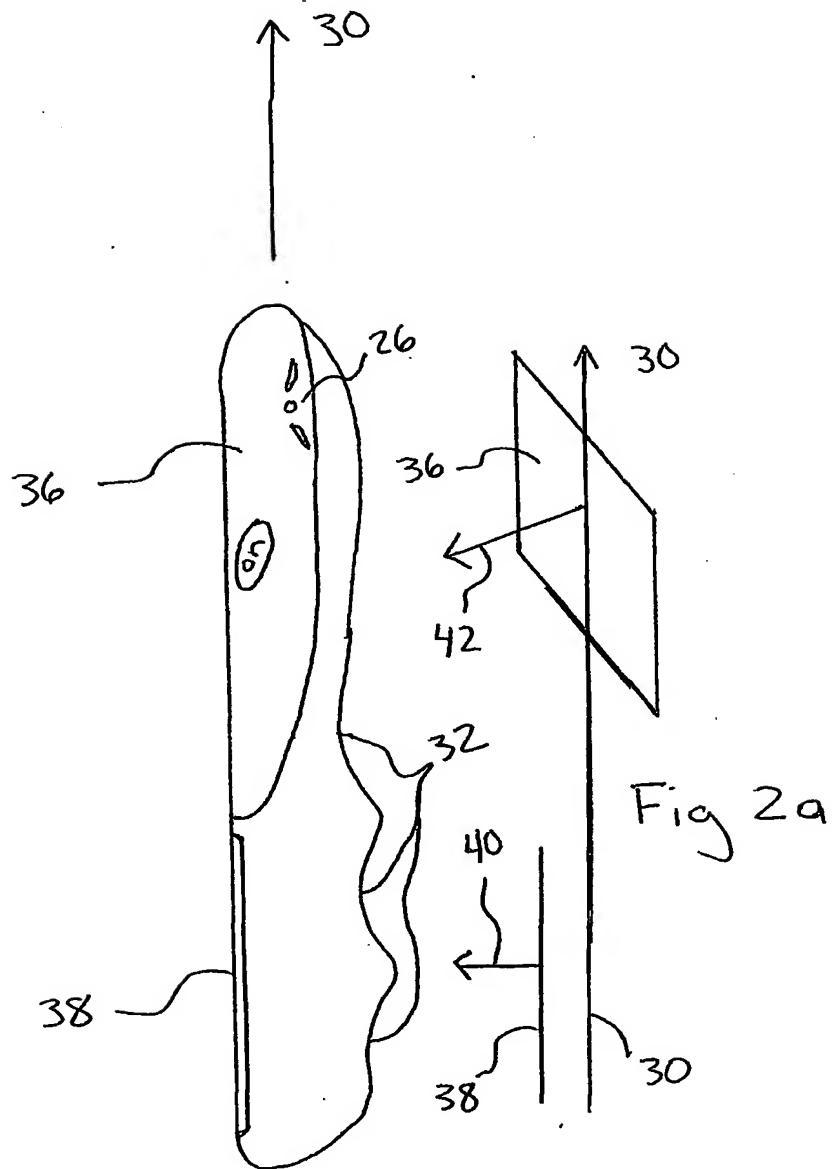
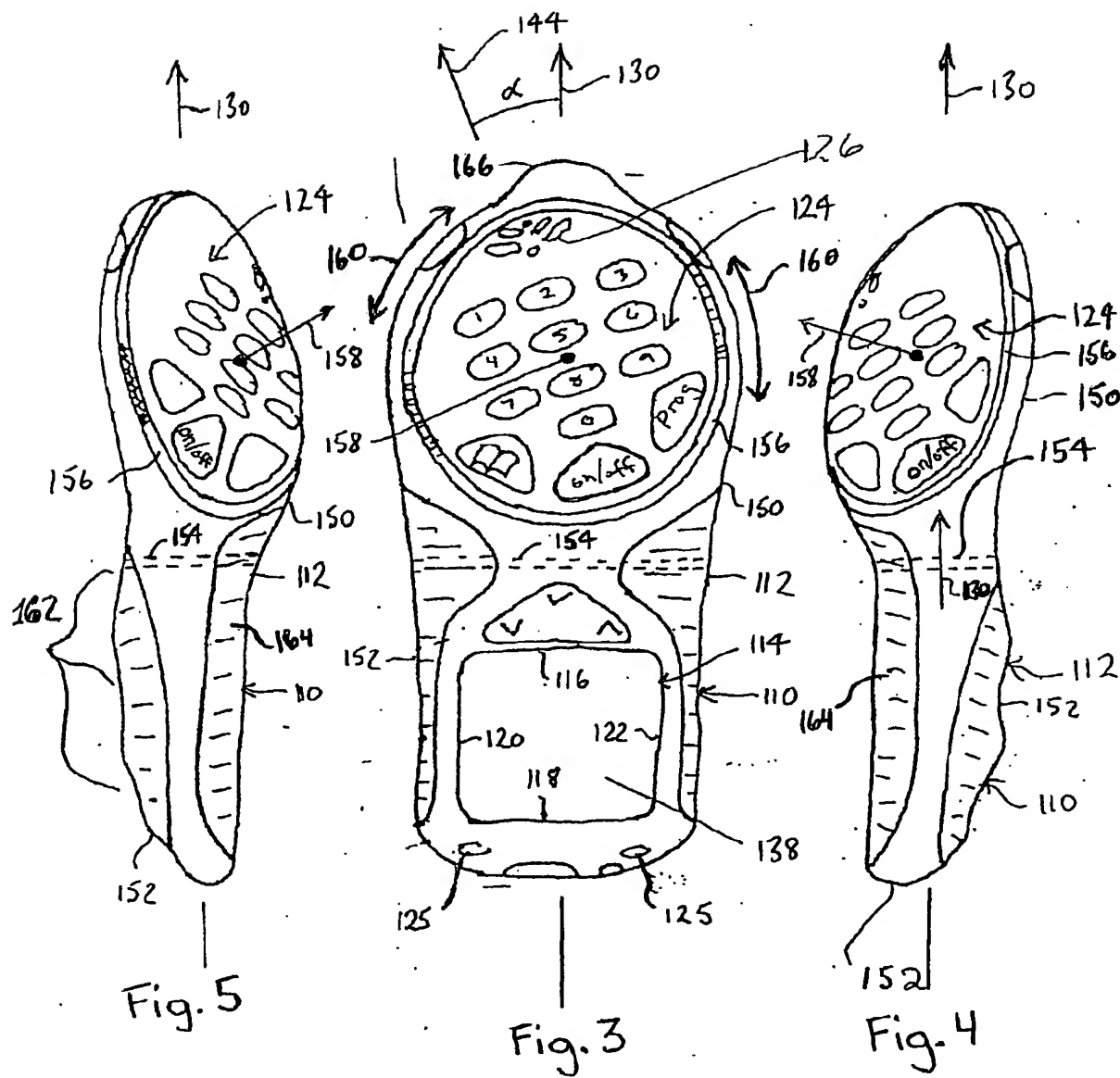


FIG. 1





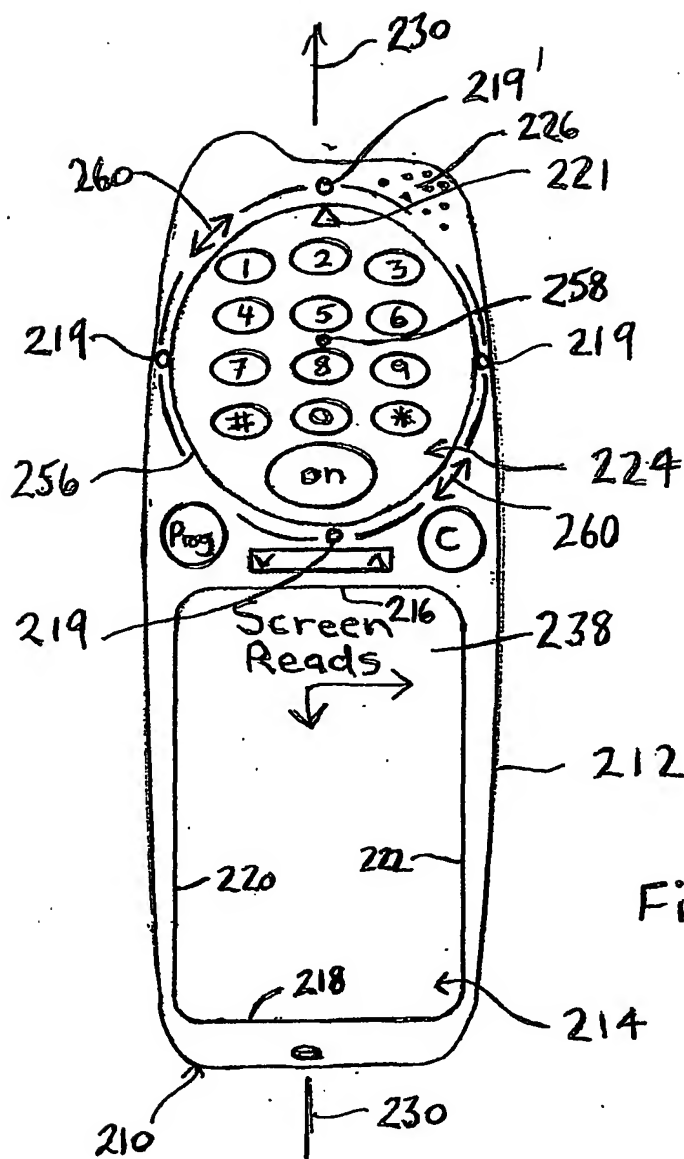
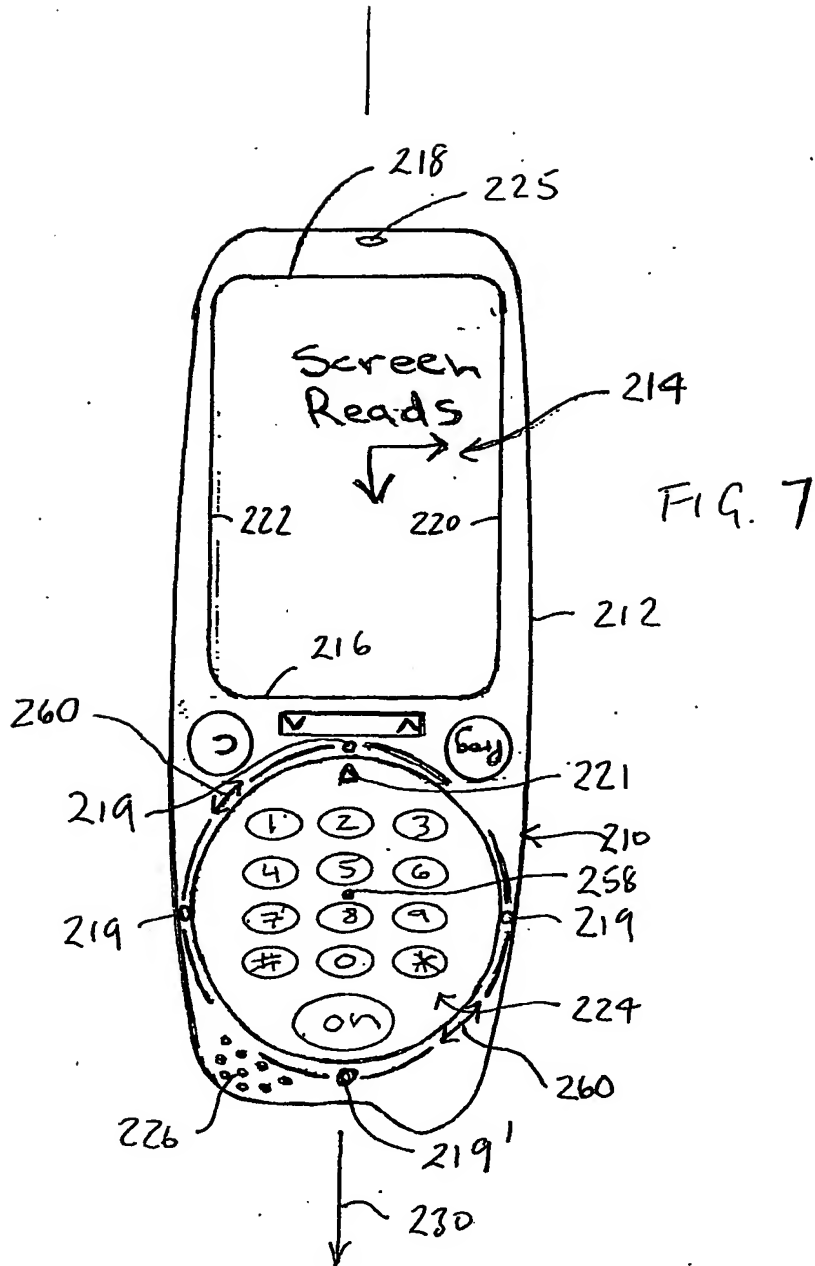


Fig 6



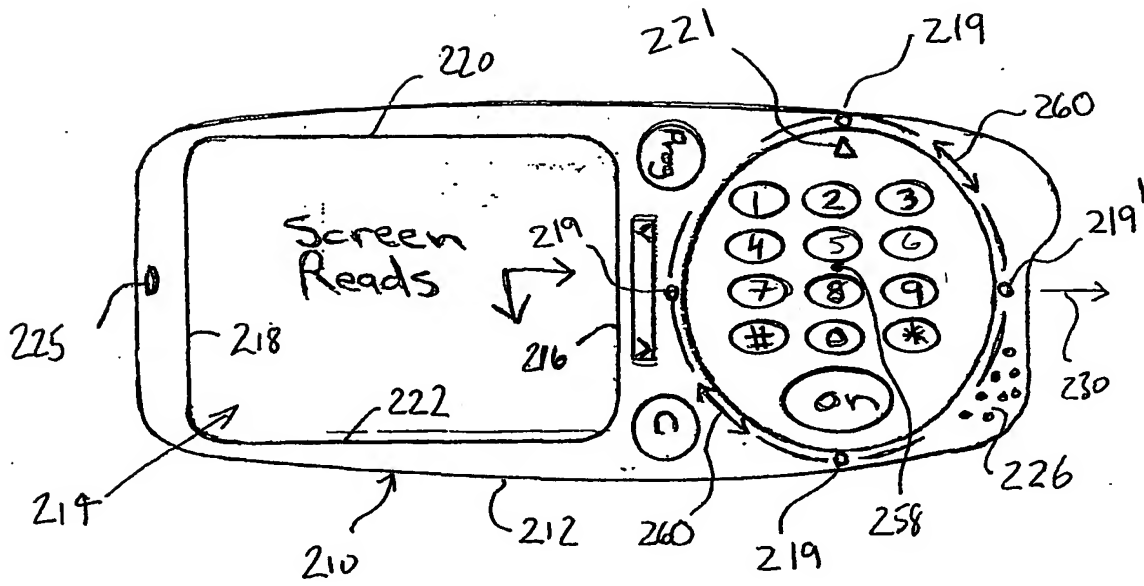


FIG 8

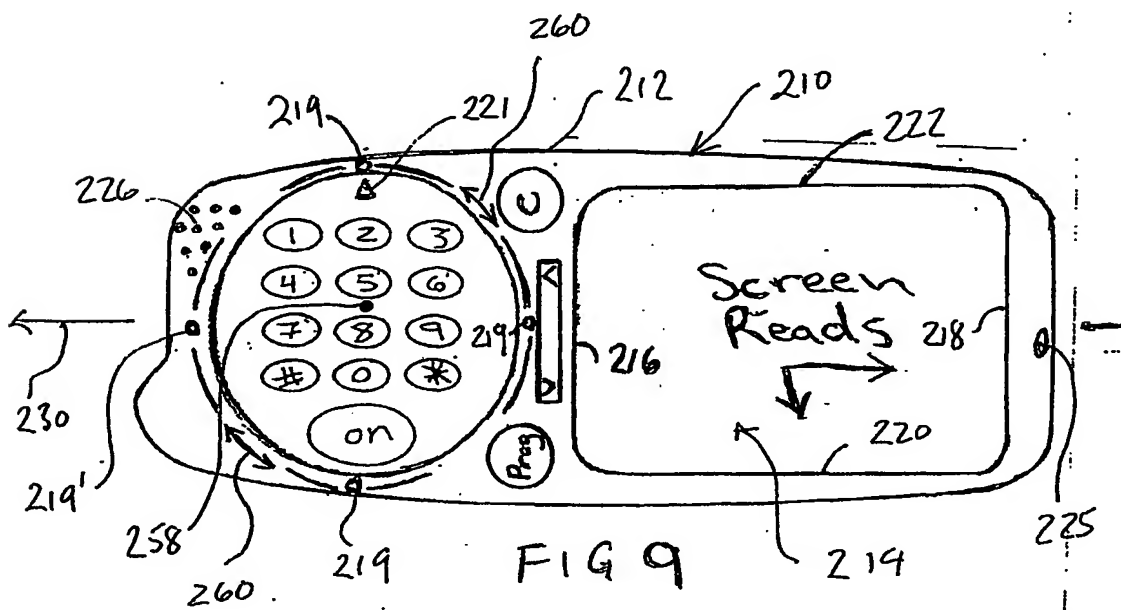


FIG 9

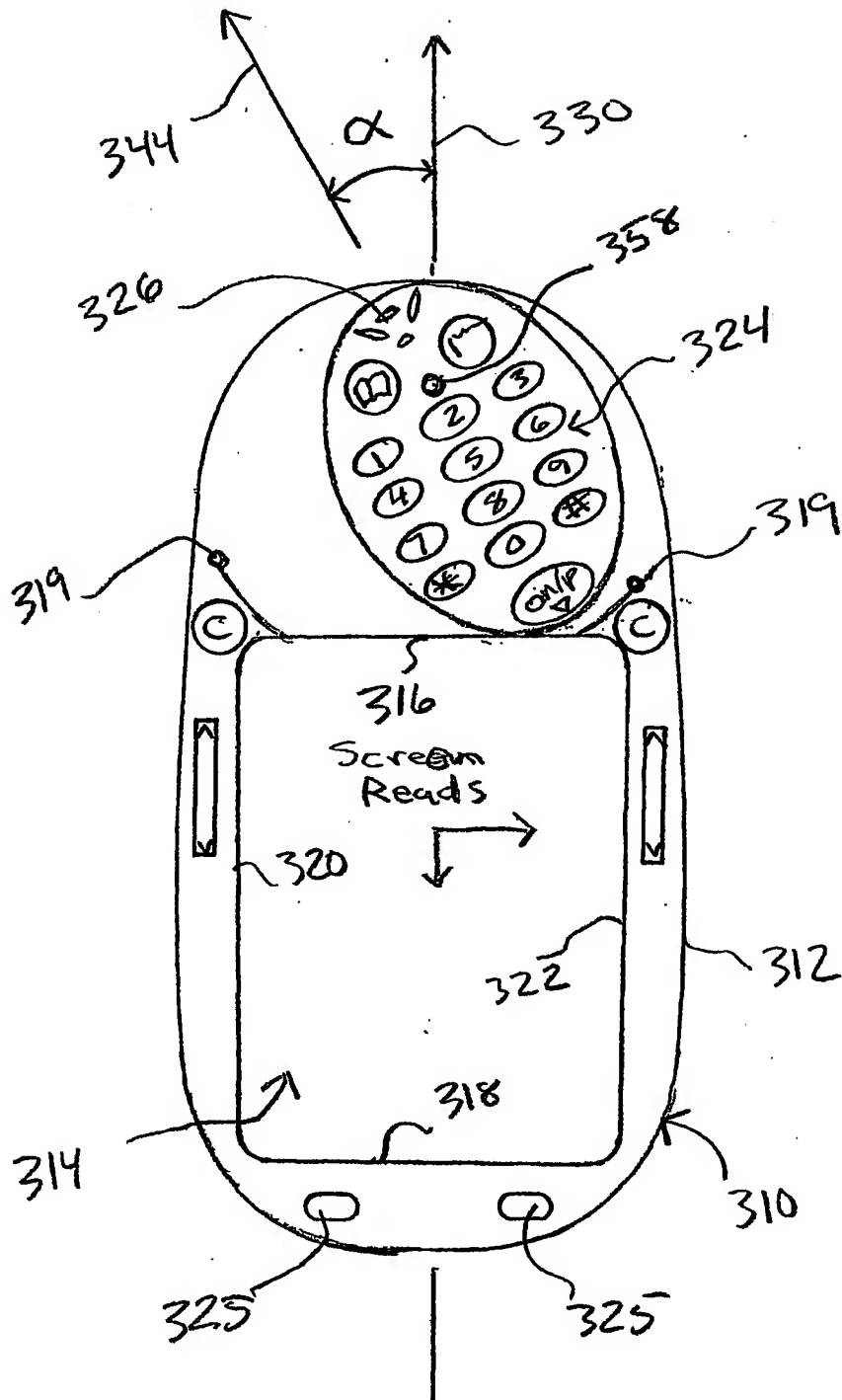


Fig 10

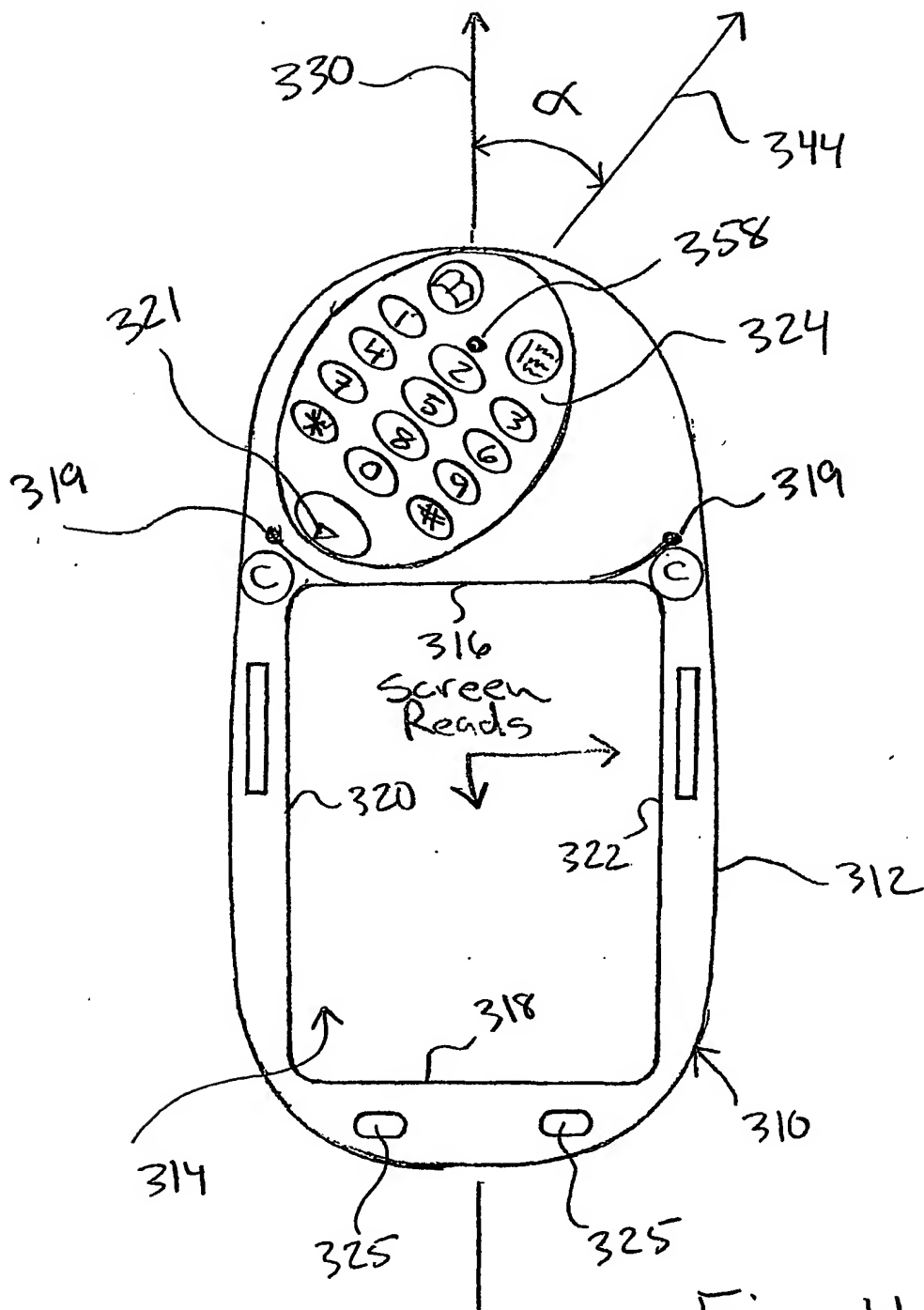


Fig 11

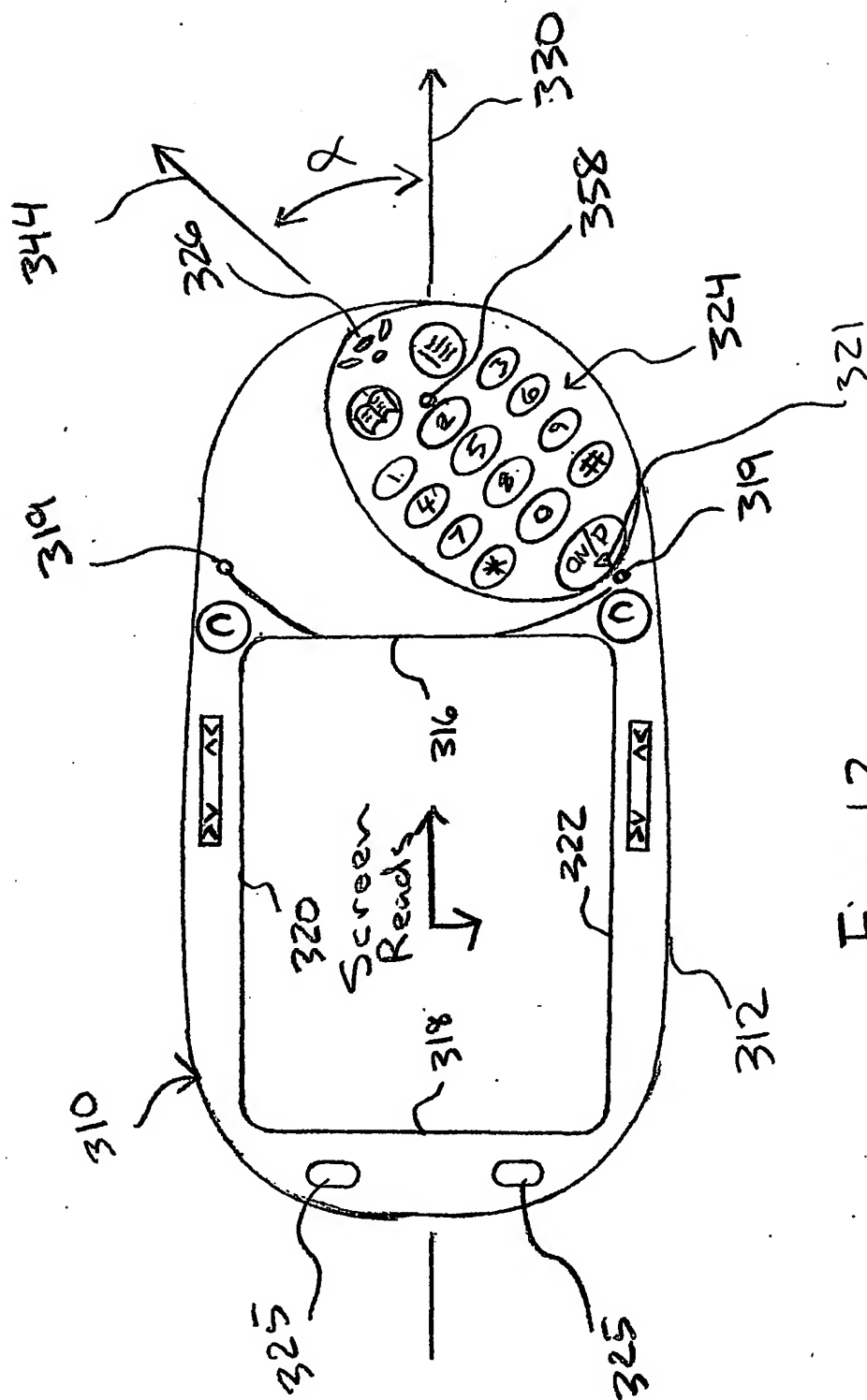


Fig 12

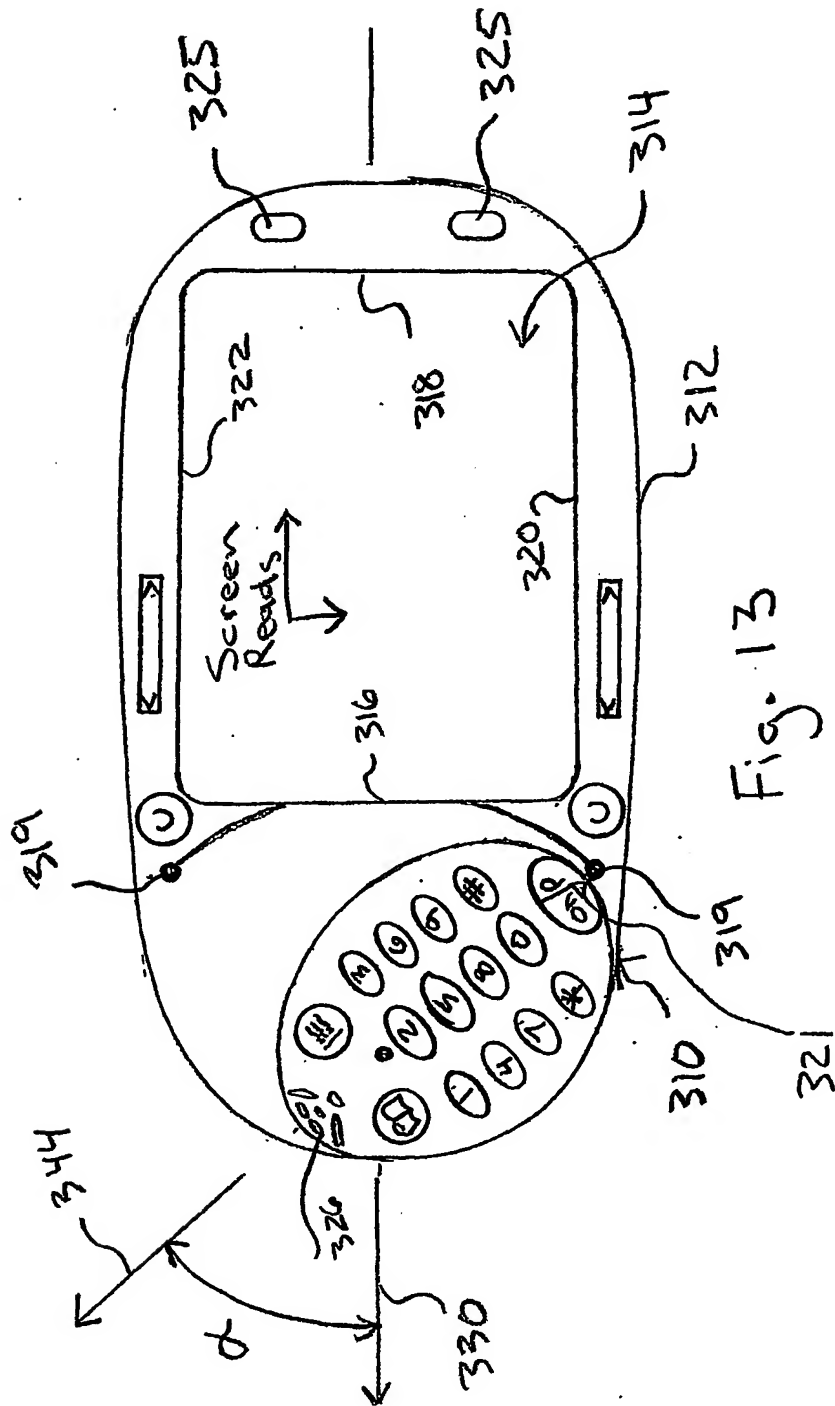


Fig. 13

INTERNATIONAL SEARCH REPORT

International Application No

PCT/EP 01/14110

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 H04M1/02

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 H04M

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EP0-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DE 198 55 022 A (INST HALBLEITERPHYSIK GMBH) 25 May 2000 (2000-05-25) abstract column 1, line 3 -column 3, line 47; figure 1	1-13
X	DE 299 17 986 U (SPUCKTI CHRISTIAN) 20 April 2000 (2000-04-20) abstract page 1, line 5 -page 2, line 15; figure 1	1-13
X	DE 299 00 166 U (FAHRNER ROLAND) 25 May 2000 (2000-05-25) abstract page 1, line 3 -page 3, line 6; figure 2	1-13
-/-		

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

* Special categories of cited documents:

- *A* document defining the general state of the art which is not considered to be of particular relevance
- *E* earlier document but published on or after the international filing date
- *L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- *O* document referring to an oral disclosure, use, exhibition or other means
- *P* document published prior to the international filing date but later than the priority date claimed

- *T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- *X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- *Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- *&* document member of the same patent family

Date of the actual completion of the international search

28 March 2002

Date of mailing of the international search report

16/05/2002

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
Fax: (+31-70) 340-3016

Authorized officer

Santacroce, J

INTERNATIONAL SEARCH REPORT

International Application No

PCT/EP 01/14110

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 00 03528 A (HENNELLY MARTIN JAMES ;NIPPON ELECTRIC CO (JP)) 20 January 2000 (2000-01-20) abstract; figure 2	2-10
A	EP 0 933 908 A (NOKIA MOBILE PHONES LTD) 4 August 1999 (1999-08-04) abstract; figures 1-3	2-10
A	GB 2 331 204 A (NIPPON ELECTRIC CO) 12 May 1999 (1999-05-12) abstract; figures 4,8,9	2-10

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/EP 01/14110

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
DE 19855022	A	25-05-2000	DE 19855022 A1	25-05-2000
			WO 0031948 A1	02-06-2000
DE 29917986	U	20-04-2000	DE 29917986 U1	20-04-2000
DE 29900166	U	25-05-2000	DE 29900166 U1	25-05-2000
WO 0003528	A	20-01-2000	GB 2339509 A	26-01-2000
			AU 4649999 A	01-02-2000
			WO 0003528 A2	20-01-2000
EP 0933908	A	04-08-1999	FI 980199 A	30-07-1999
			EP 0933908 A2	04-08-1999
			JP 2000124977 A	28-04-2000
GB 2331204	A	12-05-1999	JP 11143604 A	28-05-1999
			AU 739713 B2	18-10-2001
			AU 9132298 A	27-05-1999